

# Risk Factors for Complications and In-Hospital Mortality: An Analysis of 19,834 Open Pelvic Ring Fractures

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## ABSTRACT

Open pelvic cracks are uncommon wounds representing 2.4% of every pelvic break. These wounds are related with high quiet dreariness and death rates, revealed as high as 58%. The circumstance of mortality in open breaks ordinarily shows a bimodal appropriation. Early mortality regularly happens optional to exsanguinating drain inside the initial 24 hours. Late mortality, then again, shows on normal 17 days after the injury and is ascribed to sepsis and multiorgan disappointment.

**Keywords:** Fractures; Injury; Pelvic break

## INTRODUCTION

Open pelvic fractures are rare injuries accounting for 2.4% of all pelvic fractures [1,2]. These injuries are associated with high patient morbidity and mortality rates, reported as high as 58%. The timing of mortality in open fractures usually demonstrates a bimodal distribution. Early mortality often occurs secondary to exsanguinating hemorrhage within the first 24 hours. Late mortality, on the other hand, manifests on average 17 days after the injury and is attributed to sepsis and multiorgan failure. In addition to patient mortality, many complications are associated with these injuries due to the high energy causes of open pelvic fractures [3-5]. The identification of patient risk factors that lead to complications and mortality after open pelvic fractures has been infrequently described. The purpose of this study is to: identify overall incidence of complications and mortality after open pelvic fractures compare patient factors between those who did and did not develop a complication, identify independent risk factors for complications and mortality [6].

## MATERIALS AND METHODS

A query was performed for patients with open pelvic fractures between 2007 to 2017 using the American College of Surgeons National Trauma Data Bank (ACS-NTDB). Patient and injury specific variables were collected, and complications were identified using ICD-9 and ICD-10 Codes. Patient demographic and perioperative data was compared using Fisher's exact test and chi-square test for categorical variables, and Welch's t-test for continuous variables [7-10]. Using pooled data from multiple imputations, logistic regressions were used to calculate odds

ratios and confidence intervals of independent risk factors for complications. Model was significant ( $p < 0.001$ ) and demonstrated appropriate goodness of fit. Tests were deemed significant with a p-value less than 0.05 or, where applicable, a Holm-Bonferroni correction was done to determine an adjusted p-value.

## RESULTS

A total of 19,834 open pelvic fracture cases were identified, with 9,622 patients (48.5%) developing at least one complication. Males made up 80.3% of the cases and accounted for 79.4% of complications ( $p = 0.001$ ). Overall mortality in all patients with an open pelvic fracture was 14%.

After excluding patients who were determined to be dead on arrival to the ED ( $N = 552$ ), the inpatient mortality rate was 11.6%. The most common defined complication was pneumonia (5.8%), followed by deep and organ space surgical site infection (4.1%), deep vein thrombosis (4.0%), cardiac arrest (3.4%), acute kidney injury (3.4%), and acute respiratory distress syndrome (3.2%). Patients who developed complications were older (35.0 vs 38.1 years), and had higher Injury Severity Scores (17.7/26.5), lower Glasgow Coma Scores (14.2/11.7), and a larger proportion presenting with hypotension (21%/6.9%). After pooled regression involving 19 factors, these were the strongest independent predictors of inpatient complication and mortality.

## DISCUSSION

Morbidity and mortality remain high following open pelvic fractures. In our cohort, there was a 14% mortality rate with an inclusive complication rate of 48.5%. Jones analysed complications

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in patients with open pelvic fractures and had a similar incidence of complications (46%). The most predictive risk factors that appear to influence outcomes include GCS, ISS, and hemodynamic stability on arrival. Any opportunity to decrease complications and possibly lower mortality is of vital importance when managing these patients.

## CONCLUSION

This study is the largest overview on open pelvic fractures to date (N=19,834) and provides a summary of the complications and risk factors. The sampling strategy, uniformity of incident-level data, and methodology of the NTDB, have allowed us to build on prior literature reliant on data from single trauma systems and smaller sample sizes.

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